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Examiner K. Tamai / CAU 2834

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REMARKS:

RESPONSE DUE UNDER 37 C.F.R. §1.116  
EXPEDITED PROCEDURE  
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:

New York, New York

Roger F. BAINES

Date: May 10, 2000

Serial No.: 07/702,615

Group Art Unit: 2834

Filed: May 17, 1991

Examiner: K. Tamai

For: BRUSH ASSEMBLY WITH AXIALLY SPACED BRUSH ARMS WHICH HAVE  
DIFFERENT RESONANT FREQUENCIES (As Amended)

Asst. Commissioner for Patents  
Washington, D.C. 20231

**BY FACSIMILE: (703) 305-3432**

**REQUEST FOR RECONSIDERATION**

Sir:

In response to the Office Action mailed December 30, 1999, please reconsider the above-identified application in light of the following remarks. The remarks in the Amendment dated October 18, 1999 and the Examiner's reply in the Office Action are incorporated by reference.

The prior art rejection is based on teachings about fingerleaf brushes, while the present claims are directed to a brush assembly of a type having support arms, with "each arm carrying a respective brush body ...." That is, the present invention concerns not fingerleaf brushes, but carbon leaf brushes. Contrary to the Examiner's argument, fingerleaf brushes are in a separate class from carbon leaf brushes and carbon cage brushes. They are very different in construction and application.

Fingerleaf brushes make a different type of contact with the commutator and arc used in very low current applications, usually with motors of low life expectancy. In special applications, precious metal such as palladium-silver, silver or gold may be inlaid into the material of the fingerleaf to provide a longer lasting, harder contact area or a lower contact

resistance and are often used with commutators of similar material. Contact resistance is important, as voltages are often low and the brush pressure is very low in order to reduce brush wear which is significant due to the metal-to-metal contact. Also, the motors are physically very tiny.

Carbon leaf brushes are used in bigger motors because of their physical size. They are also used in higher current applications and have copper or carbon segment commutators requiring a softer contact material to give satisfactory life expectancy. However, wear rate is traded against contact resistance as both are affected by brush pressure, which for a carbon leaf brush is significant.

Contrary to the Examiner's assumption, a skilled person would not assume that an advance in fingerleaf brushes would be applicable to carbon leaf brushes as well. Although they usually have a common leaf base material of beryllium copper, all other aspects are different, as shown in the following table:

	<u>Fingerleaf brushes</u>	<u>Carbon leaf brushes</u>
<u>Contact material</u>	metal	carbon
<u>Spring/brush pressure</u>	very light	heavy
<u>Life expectancy</u>	low	low to high, depending on conditions
<u>Brush size</u>	tiny	small
<u>Brush contact</u>	multiple fingers	single carbon brush

(In the table, qualitative terms such as "tiny" and "small" have well-defined meanings among those working in the art.)

In order to attempt to use carbon to make multiple contacts with a commutator (perhaps after seeing a prior art multi-contact fingerleaf brush), the skilled person would not utilize multiple carbon brushes as claimed herein. Rather, the skilled person would follow the conventional wisdom and modify a single carbon brush by forming fine ridges in the contact face. Thus, the prior art would not suggest the structure now claimed.

Further, the skilled person would be skeptical of the idea of using carbon to form multiple contacts with the commutator. In the type of carbon brush just mentioned, the fine ridges in the contact face would be expected to lead to a faster bed-in of the carbon brush, leading quickly to

formation of one large contact surface, rather than many fine contact surfaces. The skilled person would believe fingerleaf brushes to be superior, since the metal-to-metal contact of the fingerleaf brush does not "bed in," but rather, wears out.

This is the first time carbon leaf brushes have been used in parallel. This is not shown in the prior art cited and it is not appropriate to suggest that it is obvious to make a carbon leaf brush assembly in the form of a fingerleaf brush.

Further, in the disclosed embodiment, two carbon leaf brushes are used in parallel with each brush designed to handle the maximum rated current of the motor. This is like having a 100% redundancy backup brush system rather than having two brushes sharing the load. This is an expensive construction not only because there are two sets of brushes, but also because the commutator has to be twice as long to accommodate the extra brush and thus the motor casing has to be longer. However, initial tests have shown very favorable results even under high current and high vibration conditions.

In view of the foregoing, reconsideration and allowance of claims 48, 51-58, 60-67, 72, 75-79 and 93 is requested.

I hereby certify that this correspondence is being transmitted by facsimile to: Asst. Commissioner for Patents, Washington, D.C. 20231, on May 10, 2000:

James A. Finder

Name of applicant, assignee or  
Registered Representative

Signature

May 10, 2000

Date of Signature

JAF:ck

Respectfully submitted,

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